

Claims

1. A method for the production of aliphatic and aromatic carbonyl compounds having at least one aldehyde or ketone function, and these compounds may also simultaneously have at least one aldehyde and ketone function, characterized in that at least one starting material, which has at least one aliphatically and/or aromatically bonded functional group of formula I



in which R^1 stands for hydrogen, alkyl or aryl, X stands for hydrogen or a group that can be substituted during the catalytic reaction for the sulfinyl group of a sulfoxide, and n stands for integral values between 1 and 8, is oxidized, in the presence of at least one sulfoxide and/or at least one sulfide in the simultaneous presence of iron salts or redox pairs of iron-copper or silver-copper salts, by means of at least one oxidant having a redox potential of $E_0 + 2 \text{ V}$ vs. NHE, the sulfoxide and/or the sulfide being used in a catalytic function.

2. The method according to claim 1, characterized in that for the production of aliphatic and aromatic mono- and polyaldehydes, at least one starting material is oxidized that has at least one aliphatically and/or aromatically bonded functional group of formula I, in which R^1 stands for hydrogen.

3. The method according to claim 1, characterized in that for the production of aliphatic and aromatic mono- and polyketones, at least one starting material is oxidized that has at least one aliphatically and/or aromatically bonded functional group of formula I, in which R^1 stands for alkyl or aryl.

4. The method according to claim 1, characterized in that for the production of carbonyl

compounds that have both aliphatically or aromatically bonded aldehyde and aliphatically or aromatically bonded ketone functions, at least one starting material is oxidized which has at least one aliphatically and/or aromatically bonded functional group of formula I, in which R¹ stands for hydrogen in the formation of aldehyde functions and stands for alkyl or aryl in the formation of ketone functions.

5. The method according to one of claims 1 through 4, characterized in that as sulfoxides, dialkyl, diaryl, or alkylaryl sulfoxides are used, and that as sulfides, dialkyl, diaryl, or alkylaryl sulfides are used.

6. The method according to one of claims 1 through 5, characterized in that at least one sulfoxide and/or at least one sulfide is used in the reaction mixture.

7. The method according to one of claims 1 through 6, characterized in that the at least one sulfoxide and/or the at least one sulfide is dissolved in the reaction mixture.

8. The method according to one of claims 1 through 6, characterized in that the at least one sulfoxide and/or the at least one sulfide is immobilized on a solid body, and this body is made into a slurry in the reaction mixture.

9. The method according to one of claims 1 through 8, characterized in that the at least one sulfoxide and/or the at least one sulfide is used with a mole fraction of 1 to 90 mol%, referred to the aldehyde or ketone function formed.

10. The method according to one of claims 1 through 8, characterized in that the at least one sulfoxide and/or the at least one sulfide is used with a mole fraction of 1 to 500 mol%, referred to the aldehyde or ketone function formed.

11. The method according to one of claims 1 through 10, characterized in that the oxidant is used in the form of powder or in an aqueous solution.

12. The method according to one of claims 1 through 11, characterized in that persulfate salts or a mixture thereof is used as the oxidant.

13. The method according to claim 12, characterized in that alkali persulfate or ammonium persulfate is used as the persulfate salts.

14. The method according to one of claims 1 through 13, characterized in that water-soluble iron salts, preferably selected from the group comprising sulfates, nitrates and acetates, are used either alone or in a mixture with water-soluble copper salts.

15. The method according to one of claims 1 through 13, characterized in that water-soluble silver salts, preferably selected from the group comprising sulfates, nitrates and acetates, are used either alone or in a mixture with water-soluble copper salts.

16. The method according to one of claims 1 through 13, characterized in that water-soluble copper salts, preferably selected from the group comprising sulfates, nitrates and acetates, are used either alone or in a mixture with iron salts or silver salts.

17. The method according to one of claims 1 through 16, characterized in that iron salts or silver salts are used in the redox pairs in concentrations of from 0.005 to 10 mol%, referred to the starting material to be oxidized, and that the copper salt is used in a molar ratio of Fe:Cu or Ag:Cu of from 0.1 to 3.

18. The method according to one of claims 1 through 17, characterized in that the oxidation is performed in an inert reaction medium selected from the group comprising water, organic solvent, and a mixture thereof.

19. The method according to claim 18, characterized in that as the organic solvent, acetonitrile, methyl and ethyl alcohol, acetone, acetic acid, dimethyl formamide, or acetamide is used.

20. The method according to one of claims 1 through 19, characterized in that the oxidation is performed at a temperature of from 10 to 100°C.